A sequence analysis to examine the transition process between physical behaviours in the workplace: how are these processes linked to cardiometabolic risk factors?

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Background: Total sedentary time (ST) is known to be associated with cardiometabolic risk factors; however, this association is attenuated for occupational ST. Furthermore, there is increasing evidence of the beneficial effects of breaking up long bouts of sitting. The aim of this study was to describe the distribution of physical behaviours during work hours with respect to cardiometabolic risk factors, using sequence analysis; this method can be used to describe the characteristics of complex time-related sequences, as opposed to traditional methods that are used to model the processes that have produced the sequences.

Methods: Data on physical behaviours and cardiometabolic risk factors were obtained from the Health Survey for England (annual health survey). In 2008, the ActiGraph GT1M accelerometer was worn by a sub-sample of participants for 7-days: physical behaviour categories (sedentary, light, and moderate to vigorous physical activity) were computed using count data. The predominant physical behaviour for each 5-minute interval of a working day was calculated.

Results: Of the 911 adults with accelerometer data (working full-time), 588 provided complete sequence data. Sedentary bouts were significantly shorter in those with elevated blood pressure and high HbA1c data; in contrast, sedentary bouts were longer in those with a high waist circumference (ns) and in those with raised HDL cholesterol (24.54 vs. 22.96 minutes; $p<0.001$). Figure 1 shows the differences in the distributions of physical behaviours for each 5-minute time interval for HDL. The spikes on the 'Low HDL' graph illustrate the higher number of sedentary bouts compared to the 'High HDL' group.

Conclusions: The underlying mechanisms of ST in the occupational domain appear to be complex with respect to cardiometabolic risk factors. Sequence analysis methods can be further utilised to identify common sequence typologies to interpret the temporal patterns of physical behaviour in the workplace.